



## **Testing>Troubleshooting VHF noise issues**

### **Objectives of this task:**

To offer solutions for various common noise issues that may affect VHF comms.

In a metal aircraft the fuselage is usually earthed and thus it tends to shield the radios (VHF, HF) from induced noise, however with the Jabiru being constructed from glass fibre other techniques must be employed to cure any unwanted electrical noise. This task will offer solutions for common noise problems. Some aircraft will suffer no noise problems at all while others may have one or several noise problems, so use only what you need from this task.

### **Noise types**

There are 2 types of electrical noise that can affect an aircraft radio:

**DC Ripple** refers to the quality of the power (DC = Direct Current) that is supplied to the aircraft radio. The power can be filtered with a suppressor type filter to reduce noise.

**RFI** refers to radiated energy from various electrical sources such as the ignition or alternator that is induced into the wiring harness and then picked up by the radio. The most useful fix for this is to fit ferrite clamp filters, either as close to the source of the noise as possible or on the radio input coaxial cables.

### **Equipment**

#### **Suppressor type filters**

An “alternator suppressor” filter, purchased from an auto electrical supplier and fitted behind the panel between the earth busbar and the avionics busbar, will often clean up any residual DC ripple noise in the power supply that has got past the standard power filter. Use this if you have a small but continuous background noise in your headset.

#### **Ferrite clamp filters**

These are readily available in various sizes at electronics supply shops and can be seen on computer monitor cables and some telephone cables. The filtering effect can be multiplied by looping the wire through the filter once (4x) or twice (16x) so if you have sufficient wire length then the more loops the better generally, up to a maximum of 2 loops.

### **Noise sources and solutions**

#### **Flap motor**

The flap motor may start to become audible in your headset once it has some use and the brushes have started to wear. This will be heard as a harsh noise when the flaps are being extended and retracted. Fit a ferrite clamp filter to each flap power wire as close to the flap motor as possible and loop each wire through each filter once.

#### **Magneto earth leads**

A single wire from each magneto coil is routed back to each MAG switch and is connected to earth to stop the engine. Indication is a light “ticking” noise that speeds up when engine revs are increased.

While the engine is running the wires are not earthed and they can radiate noise that can easily be stopped by clipping a ferrite clamp filter onto each wire just inside the firewall, before the multi-pin plug. If there is sufficient wire to loop it once though the filter then do so.



#### **Alternator**

The alternator wires will radiate a certain amount of noise, however if you have followed the instructions in the *Post-Paint>Electrical Wiring* task and twisted the pair over the full length, the effect of that twisting will be to cancel the noise at source. If not then unclip the wires from the wiring harness and twist them around each other for their full length.

#### **Strobe**

Test for strobe noise by turning the strobes off and back on. If this is a problem use a ferrite clamp filter around the strobe power supply wiring. Route strobe wiring as far away from the rest of the aircraft wiring harness as possible to prevent induced or “spill over” noise.

#### **Beacon**

Test by turning the beacon off and back on. If this is a problem use a ferrite clamp filter around the beacon power supply wiring, with each wire looped through the filter if possible.

#### **Transponder**

The transponder sends out a strong signal from its antenna that the radio can sometimes “hear” and the effect is to make VHF transmissions weaker and produce crackling sounds with incoming VHF calls. This is often the cause of reduced VHF range or rapid drop off in quality with distance. Test by turning the transponder off and back on after several minutes.

Route the transponder and VHF coaxial cables as far away from each other as possible behind the panel in the cable bundle from the panel down to the console, and fit a ferrite clamp filter over each coaxial cable (VHF, transponder) as close to each unit as possible. Hold the filter in place with a small zip tie around the cable to stop the filter from slipping down if required. Each coaxial cable must be free of any sharp bends because these can cause the earth shielding in the cable to open slightly and reduce the level of signal rejection, so check your cable routing carefully and correct any sharp bends.

In some cases the proximity of the VHF and the transponder units in the panel can cause signal bleed between the units. If possible locate the transponder as far away in the panel from the VHF unit(s) as possible. This signal bleed reduces at the square of the distance so a small change (movement away) is all that is usually needed.

In rare but extreme cases relocating the transponder antenna towards the rear of the fuselage, well away from the VHF unit(s), has fixed the problem.

#### **Electric turn and bank indicator (ETI)**

The electric motor that runs the gyroscope in the ETI may return noise into the avionics – test for this by turning the ETI switch off and on. If this is a problem consider rewiring the ETI power supply away from the avionics busbar to a separate, different 5 amp circuit breaker.

#### **Microphone noise**

If you can hear noise in your headset each time that you press the transmit button, fit a small ferrite clamp filter to each microphone wire in each headset jack.

In 4 seaters with 2 VHF comms and 2 antennae some noise will be radiated from the internal antenna in the empennage that may be picked up by the rear headset jacks. Ferrite clamp filters around the microphone wires, with each wire looped through the filter once, will usually clean this up. If the problem persists it may be necessary to make a small earth shielded cover for each set of headset jacks in the rear seats.

This completes the *Troubleshooting VHF noise issues* task.